NASA Glenn Safety Manual

CHAPTER 1A - SAFETY PERMIT SYSTEM

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1A.1 SCOPE

The objectives of the Safety Permit System are to avoid undue risks, injury to personnel, damage to property, or disruption of operations by:

- Assuring that a systematic approach is used to identify and control potential hazards
- Obtaining an independent, thorough, and timely safety review of all technical designs, tests, and operations
- Permitting the operation of facilities, systems/subsystems and experiments within safe constraints
- Control changes to permitted facilities system/subsystems and experiments to ensure continued safe operations
- Instilling safety awareness in all employees, and ensuring that facility/test personnel have received the necessary training to safely and properly operate test facilities and research rigs.

The safety permit constitutes a license to operate a facility or piece of equipment within the constraints listed on the Permit. All proposed activities, operations, and tests should be reviewed by the Safety Committee Chairperson to determine if a Safety Permit is required. The Safety Permit System described in this Chapter typically does not cover construction and maintenance activities, or activities where there is an ongoing contractual safety obligation covered by a site-specific safety and health plan. (see Chapter 17).

A "Safety Permit Requestor's Guide" detailing the process for obtaining a safety permit is described in section 1A.11.

The degree of detail, rigor, and formality required for the safety permit review is dependent on the complexity, hazards, and uniqueness of the test. Communication with the Area Safety Committee, GSO, and EMO early and often will assure a smooth and thorough safety review process.

1A.2 AUTHORITY

The authority for the Safety Permit System comes from the Glenn Safety Manual Chapter 1 Glenn Safety Management.

1A.3 APPLICABILITY

These instructions on the Safety Permit System apply to all Cleveland and Plum Brook Station facilities and technical operations and to organizational elements and personnel involved in offsite operations.

1A.4 POLICY

It is the responsibility of cognizant personnel assigned to a system or operation to ensure that its design and operations are safe. All systems should be designed to fulfill fail-safe requirements and to avoid an unsafe situation in an interfacing system. A Safety Permit Request must be submitted to the cognizant Safety Committee Chairperson for all proposed Glenn test operations, and/or modifications to center process systems and high voltage (>600 Volts) electrical systems.

Expired Safety Permits: Operation of any facility, rig, system, or experiment is forbidden if the governing Safety Permit has expired. All personnel are under instructions not to operate or perform work unless the activity is covered by a valid permit. The Glenn Safety Office maintains a file of all Safety Permits, maintains a Safety Permit Tracking System, and provides notification of expiring permits 60 days prior to expiration.

Stop Work Authority: Safety Committee Chairpersons have the authority to shut down any operation or activity in their assigned areas on which there is a question of safety, until an appropriate review can be made. Exercise of this authority requires immediate notification to the Chairperson of the Executive Safety Board and the Chief of the Glenn Safety Office.

Modifications to rigs or operational limits: A Safety Permit is invalidated by any change in the apparatus, operating conditions, or qualified operators list unless the change has been approved by the cognizant Safety Committee.

1A.5 GLENN SAFETY ORGANIZATION

The Glenn Safety Organization is described in Chapter 1 of this Manual. Specifically, the roles and responsibilities of the Aviation Safety Officer, the Process Systems Safety Committee, the Electrical Applications Safety

Committee, the Area Safety Committees, and the Radiation Safety Committee are defined in Chapter 1 of the Glenn Safety Manual, "GRC Safety Management".

Safety areas of the Cleveland Center are shown on the Safety Area Map.

All of Plum Brook Station, with the exception of the Reactor Facility, is considered Area 9.

1A.6 GLENN SAFETY PROGRAM

The Glenn Safety Program is described in Chapter 1 of this Manual, with additional elements of the Safety Program described in the various chapters of this Manual and the Glenn Environmental Programs Manual.

1A.7 PROCESS

The Safety Permit Process can be divided into eight distinct steps:

DETERMINATION	Does a proposed activity require a Safety Permit?
APPLICATION	Requestor prepares C-923 Safety Permit Request form with supporting documentation and obtains supervisor approval.
REVIEW	Area Safety Committee, Safety Office, and Environmental Management Office review Permit Request.
ISSUANCE	Permit (C-919 form) is issued and documentation is filed.
MAINTENANCE	Activity is performed until permit expires or modifications are made (change request).
MODIFICATION/RENEWAL	Modification of design, operating conditions, procedures, or facility assessed and documented on C-590 Renewal/Change Request Form.
TERMINATION/PHASE DOWN	Activity is completed, permit is removed and cleanup is performed, paperwork is closed out with Safety Office.
APPEAL	If a Permit is denied or a stop work order is issued, the Requestor can appeal to Executive Safety Board. This step is reserved for situations where a Risk Management decision must be made which goes beyond the authority of the Safety Committee.

1A.7.1 Determination

The need for a Safety Permit is determined by the Safety Committee:

The Area Chairperson or their designated Committee Member by reviews the nature and extent of the hazards associated with the proposed activity. As a general “rule of thumb” any operation or activity, which uses hazardous chemicals, pressurized systems, lasers, electrical or mechanical energy sources, or otherwise requires fire/life safety controls will need to be permitted. The chairperson/committee member is supported by GSO and/or EMO staff in making this determination.

Researchers are advised to properly estimate the costs associated with safety controls.

1A.7.2 Application

The following steps are required to initiate a Safety Permit Request:

Note: Some facilities have safety permits for the entire facility, and the requester needs to be aware of facility safety constraints to ensure compliance with the facility specified parameters.

a. Based on the initial "DETERMINATION" meeting as described above, the chairperson/committee member advises the requester on the nature and detail of documentation and analyses that should accompany the formal safety permit request. As a minimum, all research activities or facilities, which require a safety permit, must have a hazard analysis performed per the NASA Agency Safety Initiative, 1999, and the requirements of this chapter.

Also, the number and nature of additional meetings are established. The committee may counsel the requester to consult with advisory bodies and may furnish examples of the documentation it requires. The key element is early notification of and continuing involvement by the Area Safety Committee through any incremental progress meetings.

b. When the design is complete, and in a timely fashion (typical 30-60 days prior to the planned initiation of operations, depending on the scope and complexity of the planned activity), the requester prepares and submits the Safety Permit Request (NASA Form C-923), a Hazard Analysis Worksheet (NASA Form C-923a) or a Facility Hazards Analysis, the

Qualified Operators List (C-580), and supporting documentation to the Chief of the initiating branch for review and signature. When the requestor is a NASA contractor, the Branch Chief of his or her NASA organization acts as the "NASA Technical Supervisor" on the C-923 form.

In summary, the Safety Permit Request (C-923), Qualified Operator's List (C-580), and Hazard Analysis Worksheet (C-923a) or Facility Hazards Analysis with the supervisor's signature comprise the formal application for a Safety Permit.

1A.7.3 Review

The Safety Permit Request package is then submitted to GSO for recording in the SAFEPERM tracking database. If the submittal is complete, the Request is forwarded to the Area Safety Committee Chairperson immediately and a review copy is circulated in GSO/EMO. To expedite the permit process it is strongly recommended that originals plus at least one copy with signatures of permit documentation be submitted to the GSO (M/S 6-3).

After submittal of the request to the Area Safety Committee Chairperson, the Safety Committee schedules and conducts a review of the proposed operation. Reviews shall always be conducted by at least 2 Committee members. The Safety Committee may call on advisory personnel to assist it. The GSO/EMO conducts a parallel review to ensure compliance with OSHA regulations, NASA safety standards, environmental, industrial hygiene, hazardous chemical, or health physics requirements.

After the committee has reviewed the submittal, a safety review meeting and walk through of the facility is held. Opinions, concurrences, or clarifications are to be documented and preserved by the Area Safety Committee Chairperson as part of the review record. GSO/EMO representatives must provide their input at this time. If action items are assigned to the requestor, another meeting may be required to complete the review.

1A.7.4 Issuance

After the Safety Committee approves the issuance of a safety permit, the chairperson or their designee prepares the Safety Permit (C-919) with appropriate operating conditions included. The chairperson signs the original safety permit and adds the Permit Number and date to the Qualified Operators List.

The GSO/EMO provides the appropriate NFPA Hazard Identification code, indicating appropriate emergency response measures.

The GSO Safety Permit Coordinator logs the permit into the SAFEPERM database and sends the original safety permit (with the colored NFPA hazard identification sticker attached), the Qualified Operator List, and the Safety Permit

Request to the requester for posting at the work site. A copy of the permit and Hazard Analysis is filed in the GSO by the GSO Document Administrator.

The Safety Committee Chairperson or committee members retain copies of any documentation needed for reference material by the Area Safety Committee, such as presentation materials from the review meetings. The Area Safety Committee may use these files as needed for renewals/modifications of a Safety Permit, or they may utilize GSO files through the GSO Document Administrator.

1A.7.5 Maintenance

The requester posts the original safety permit (together with an attached copy of the Safety Permit Request and the Qualified Operator List) in a conspicuous place at the specified site, or if more practical, in the applicable control center of the site. It is recommended that applicable Material Safety Data Sheets (MSDS's) be posted with this package.

Operations under a Safety Permit

The safety permit allows the requester to begin the operation or experiment. The permit outlines the operations, which are covered, and includes any operating conditions, which must be met in order to maintain safe operations.

Any deviation from the procedures stated on the safety permit must be reviewed by the Safety Committee. Failure to comply with the procedures and operating conditions found on the safety permit and any accompanying documentation will result in termination of the operation by the Safety Committee Chairperson and/or GSO.

Safety-related questions on a permitted operation by the building manager or other parties working in the area should be brought to the attention of the Safety Committee Chairperson or GSO.

Safety permits are typically issued for a one-year period. There may be permitted activities, which the Safety Committee determines to be relatively benign and unchanging (generally not testing-related activities) where the Committee is willing to issue a three-year or five-year Permit. The decision to issue a multi-year Permit is at the discretion and control of the Area Safety Committee Chairperson.

Modification of a Safety Permit

If there is a change required in the purpose, procedures, operational limits, qualified operators, or design of the activity while the existing permit is in force, a modification of the Safety Permit must be requested. To accomplish this, the requester informs the Safety Committee Chairperson (via memo or e-mail) of the proposed modification(s). The cognizant Safety Committee then conducts the

necessary review. For minor changes (with no new or different hazards), the Safety Committee Chairperson responds to the requester with an approval memo, which the requester shall post with the Safety Permit package. For major changes, the Safety Committee Chairperson requests that a Safety Permit Renewal/Change Request Form (C-590) or new permit request) with updated support documentation be initiated.

Renewal of a Safety Permit

A notification of expiration will be sent via email to the permit holder by the GSO sixty (60) days prior to expiration. Expiration notices are also sent to the Safety Committee Chairperson, the assigned GSO Representative, and the building or facility manager as applicable. However, it is the responsibility of the permit requester/owner to be aware of permit conditions and expiration date, and to initiate renewal process prior to the 60-day notice. The 60-day notice is a courtesy, and regardless of receiving notification, it is GRC policy to forbid conducting operations with an expired safety permit.

If there are no changes to the operation and the activity will not be completed before the safety permit expires, then at least 30 days prior to the safety permit expiration, the requester shall:

a. Ensure that all documentation submitted with the original Safety Permit Request is accurate and up-to-date. Ensure that all limit switches, warning lights, detection systems, interlocks, and other safety features are functional.
b. Complete a Safety Permit Renewal/Modification Request Form (NASA-C-590) and obtain the supervisor approvals.
c. Complete a new Qualified Operators List.
d. Obtain supervisor signatures on C-590 and C-580 (qualified operators list).
e. Complete a revised/updated Hazard Analysis Worksheet (NASA C-923a) or Facility Hazards Analysis.

The renewal now becomes similar to a permit request and is processed exactly the same. Evaluation of the renewal/change request starts at the beginning of the "REVIEW" process described above, with the renewal/change request taking the place of the permit request.

The permit holder or requestor shall send the C-590 form and the new C-580 form to the GSO Permit Coordinator. The GSO Permit Coordinator logs in the request and forwards a copy to the Safety Committee. The Safety Committee then conducts a review. The depth of this review will depend on the number of changes and any other factors brought to light by recent operating history.

1A.7.6 Termination

Upon completion of the operation or activity covered by a safety permit, the responsible individual:

a. Removes, dates, and signs the copy of the safety permit in the space provided and returns the Safety Permit to the GSO for permanent filing.
b. Coordinates phase out of the operation, disposition of equipment, and removal and proper disposal of all hazardous material in accordance with the applicable safety standards. Contact the EMO Waste Management Team for assistance with chemical disposal.

The GSO Permit Coordinator enters the closure data into the SAFEPERM database and notifies the Area Chairperson via email that the safety permit has been terminated. The GSO Document Administrator then files the permit in the "historical" files per the applicable document retention schedule.

1A.7.7 Appeals

If a permit request is denied or the Hazard Analysis indicates that the risks cannot be mitigated without excessive expense or unacceptable time constraints, the Requestor can appeal to the Executive Safety Board (ESB. This step is reserved for situations where a Risk Management decision must be made which goes beyond the authority of the Safety Committee. All appeals to the ESB are through the Chief, GSO.

1A.8 SAFETY FORMS

Most safety forms are now available via the Glenn Electronic Forms Website. Due to the nature and complexity of research activity, always verify that the form you are requesting or using is the latest version.

These forms are available in Informed Filler and PDF format.

Safety Permit Request (NASA Form C-923) Form C-923 constitutes formal application for permission to operate a facility, rig, system, experiment, or such. The formal request shall be submitted to the cognizant safety committee 30 to 60 days prior to the contemplated initiation of operation. As described previously, notification of and discussions with the cognizant Safety Committee is required at the time the conceptual design is completed so that the specific requirements for analyses, drawings, and the like may be established.

Hazard Analysis Worksheet (NASA C-923a) Indicate known hazards and control mechanisms.

Safety Permit (NASA Form C-919) Form C-919 indicates that a facility, rig, system, experiment, or operation has been reviewed by a Safety Committee; it constitutes a license to operate the facility within the constraints indicated thereon. A Safety Permit is valid for a 1-, 2-, or 3-year period from the date of issue, as determined by the cognizant Safety Committee.

Safety Permit Renewal/Modification Request (NASA Form C-590) A Safety Permit Renewal/Modification Request shall be submitted no later than 30 days prior to the expiration date of the Safety Permit or planned modification. The routing of the Renewal/Modification Request is the same as for an initial Safety Permit Request.

Qualified Operators List (NASA Form C-580) Form C-580 lists qualified operators and describes the experience and training requirements for each operator. This document should be used only in conjunction with a valid Safety Permit.

Users Radiological Training and Experience Record (NASA Form C-197) When the use of radioactive materials or radiation-producing equipment is involved, a C-197 for each user must be attached. A user is defined as a person qualified by training and experience to use radioactive material and ionizing radiation-producing devices in a safe manner. The user is responsible for the safekeeping of material and equipment, as specified in the Safety Permit under his or her control.

1A.9 SUPPORTING DOCUMENTATION

The Safety Committee Chairperson will advise the requester of the supporting documentation, which will be needed with the Safety Permit Request. Samples of supporting documentation and requirements for specific systems are provided in the Requestor’s Guide, Appendix A.

1A.10 OFF-SITE OPERATIONS

Glenn employees at another NASA Center or Government agency: If an operation is conducted at a site or in facilities of another NASA Center or Government agency, or in their aircraft or vessels, the safety review and approval procedures of the Center or agency govern and are to be complied with; therefore a Glenn Safety Permit is not required. The Glenn employee in charge must take positive action on his or her own initiative to ascertain the host organization's requirements for safety approval and must see that they are fulfilled. No Glenn operation may be conducted without such safety approval. In addition, the Glenn employee in charge must inform GSO, by letter, of the nature and character of the offsite operation. The Chief of the GSO is not responsible for reviewing and approving the operation (this is the responsibility of the host organization).

However, if the Glenn employee has a significant concern based on his or her experience and expertise, the employee may request that the Chief, GSO or the Chairperson of the Glenn Executive Safety Board have the matter appropriately investigated through a formal request to the host organization.

Glenn employees at un-hosted site: If Glenn personnel conduct an offsite operation where there is no host organization, and if the whole organization has no properly approved safety procedures in effect or the whole organization places all or part of the safety approval under Glenn' responsibility, the operation is subject to the same rules and regulations set forth in the Glenn Safety Manual for onsite operations. All such offsite operations require preparation of a safety permit request in accordance with this Manual. The offsite request is submitted to GSO for appropriate safety review and determination.

Government-retained offsite personnel: Non-Government members of an offsite research team, when retained as Government experts or consultants (i.e., special Government employees), are required to observe the pertinent regulations of the Glenn Safety Manual. The Glenn employee in charge ensures that a copy of such regulations and related instructions is made available. Safety regulations of other Government agencies involved are recognized as a part of the total safety requirement for the program and are to be adhered to by all Glenn personnel concerned.

1A.11 SAFETY PERMIT REQUESTERS GUIDE

Safety Philosophy - What types of activities require a Safety Permit?

The need for a safety permit is determined by the nature and extent of the hazards associated with a proposed activity.

Examples of activities/operations which may involve hazards and may require a safety permit include:

a. USE OF FUELS OR OXIDIZERS
b. USE OF CHEMICALS OR OTHER HAZARDOUS MATERIALS
c. USE OF COMPRESSED GASES
d. HIGH TEMPERATURE OPERATIONS (OVER 140°F)
e. USE OF HIGH VOLTAGE ELECTRICAL POWER
f. HIGH SPEED ROTATING EQUIPMENT
g. USE OF IONIZING RADIATION SOURCES
h. USE OF LASERS
i. USE OF PRESSURIZED VESSELS OR SYSTEMS
j. USE OF VACUUM SYSTEMS

k. USE OF CRYOGENS
l. AIRCRAFT OPERATIONS
m. SUSPENDED LOAD OPERATIONS
n. MODIFICATIONS TO PERMITTED OPERATIONS
o. FALLS

As you can see, most research activities at GRC fall into one of the categories shown here. Chances are if you're reading this guide, someone has pointed out to you that you need a safety permit for what you're doing.

It is sometimes useful to look at "hazard categories" to identify and evaluate hazards associated with an activity. These categories are defined in the Hazard Analysis section of this Guide:

a. CHEMICALS
b. COLLISION
c. CONTAMINATION
d. ELECTRICAL SHOCK
e. TEMPERATURE EXTREMES
f. FIRE
g. POTENTIAL OR KINETIC ENERGY
h. EXPLOSION
i. IMPLOSION
j. HIGH NOISE
k. RADIATION
l. LOSS OF HABITABLE ATMOSPHERE
m. CORROSION
n. PATHOLOGICAL (Biohazards)
o. FALLS

These hazard categories are the basic building blocks for any hazard analysis and are routinely evaluated at GRC for operations requiring safety permits.

Of course, there are a number of activities at GRC which involve hazards not considered here, such as construction, riding bicycles, driving automobiles, Machine Shop operations, etc…. Most are covered by other chapters in the Safety Manual.

Use your head! If you are doing research or testing in a GRC lab or facility, or a new system or process is being added to a facility with a facility operating safety permit, a safety permit or Modification/Renewal is **required**.

Area Safety Committees and Glenn Safety Office (GSO)

Who do I talk to about getting a Safety Permit?

Your first point of contact should be your supervisor. Then discuss the proposed activity with the Chairperson of the appropriate Area Safety Committee or Glenn Safety Office Area Representative.

The Center is divided into nine Safety Areas, eight at the Cleveland Center and one at Plum Brook Station. These areas are shown on the map of the Center: Center Safety Area Map.

Each Safety Area has a Safety Committee, which includes a Safety Chairperson and a GSO representative. The Center also has the following special Safety Committees:

a. **Laser Safety Committee** - for research operations using laser internal or external to system
b. **Process Systems Safety Committee** - for central service systems and pressure systems.
c. **Electrical Applications Safety Committee** - for the Center's power distribution system
d. **Plum Brook Reactor Facility Decommissioning Safety Committee** - to ensure compliance with the Nuclear Regulatory Commission (NRC) requirements for the Plum Brook Reactor Facility.

All of Plum Brook, except for the reactor facility, is designated as Area 9. A List of Safety Chairpersons and GSO Representatives can be accessed from the GSO Web Page.

At what stage of my project should I talk to the Safety Chairperson?

You should contact the Safety Chairperson and the GSO representative as early in the project as possible, preferably during the conceptual design phase of the new activity. Be prepared to outline the proposed activity and any associated hazards. Documentation of this initial contact is important, so that a record of review and response is generated.

How long does the Safety Permit process take?

The Safety Permit Request (NASA C-923) and supporting documentation should be submitted about two months prior to the planned activity start-up date. This will provide time for Safety Committee review and scheduling the necessary

meetings. The Safety Chairperson can provide additional guidance on the specific length of time, based on the nature and complexity of the project or activity. For large projects with major hazard potential, several safety committee reviews may be required, e.g., at conceptual design review, preliminary design review, critical design review, and prior to start-up (readiness review).

The degree of detail, rigor, and formality required for the safety permit review is dependent on the complexity, hazards, and uniqueness of the activity.

Early communication with the Safety Committee and GSO/Environmental Management Office (EMO) will assure a smooth and thorough safety review process by increasing the Safety Committee's familiarity with the activity.

What are the "keys to success" to ensure that the permit is obtained in a timely manner?

a. Involve the Safety Committee early
b. Submit the proper supporting documentation with the Safety Permit Request package
c. Use similar systems (past precedence) for reference. The GSO can assist. Safety Permits for similar activities may be in place.
d. Encourage peer and supervisor review prior to submittal to the Safety Committee

OK, I'm Ready! How Do I Start the Safety Permit Process?

Contact the Safety Committee Chairperson at the conceptual design phase of your activity or as early as possible.

The Chair will determine if a safety permit is required and will discuss the requirement for any necessary supporting documentation, as well as the Safety Committee review process.

Obtain and complete a Safety Permit Request Form (NASA C-923), a Hazard Analysis Worksheet (NASA C-923a) or Facility Hazard Analysis, and Qualified Operators List (QOL) Form (NASA C-580). Copies of these forms are provided on-line in several formats: http://forms.grc.nasa.gov/Forms/PublicUser/index.cfm Prepare any necessary supporting documentation as determined by the Safety Committee.

Conduct a review of the following documentation with your supervisor to ensure accuracy and completeness:

a. Safety Permit Request Form (NASA C-923)
b. Hazard Analysis Worksheet (NASA C-923a) or Facility Hazard Analysis
c. Qualified Operators List Form (NASA C-580)
d. Supporting Documentation

Have the NASA supervisor sign the Safety Permit Request Form and Qualified Operators List Form. It is also necessary to have the Qualified Operators List Form signed by the actual supervisor(s) of the qualified operator(s).

Submit the package to GSO. This will allow tracking of Safety Permit Requests by the GSO. The GSO will forward the request to the Area Chairperson within 48 hrs, if the Permit Request is properly completed. If there is no hazard analysis, QOL, or proper signatures, the request will be returned to the requestor for correction immediately. After review of the request for completeness, the request will be forwarded to the Committee Chairperson, and GSO will begin tracking the permit. The Safety Committee Chair or designee will then contact you to set up a meeting and a walk-through for your activity. (This step does not constitute a full technical review, but can be considered a "quality check").

What supporting documentation should be submitted with the Safety Permit Request?

A Hazards Analysis (either the Hazard Analysis Worksheet or the Facility Hazard Analysis) is **always** required. A QOL with training information is **always** required. The Safety Chairperson will inform you of any additional supporting documentation which will be needed. This may include:

Description of the Activity

a. Test objectives
b. Test description
c. Technical description of the test rig, systems, equipment, etc.
d. Location of the activity
e. Duration and frequency of operations

Design Criteria

System or project requirements

a. Design approach and assumptions
b. Applicable codes and guidelines used
c. Supporting calculations
d. Design and Operating Limits

e. Quality Assurance Plan
f. Configuration Control Plan

Test of inspection documentation (e.g., pressure test results for pressure vessels)

Operational Information

Initial check-out plan

a. Operating Procedures/Checklists, including normal start-up, shutdown, and operations
b. Emergency Plans and Shutdown Procedures
c. Equipment or system limits
d. List of alarms, shutdowns, and permissives
e. Access control requirements

Maintenance Information

Maintenance procedures and schedules (for items which have safety implications)

a. Logbooks or maintenance data sheets
b. Lockout/Tagout procedures
c. Recertification requirements
d. Radiation or Radioactive material information
e. Training of Qualified Operators
f. Buddy System

Safety Permit Review

How Is a Safety Permit Request reviewed?

When the Safety Committee Chairperson receives the Safety Permit Request package, he or she will contact their committee members to schedule a meeting and begin the review.

The Safety Committee and GSO/EMO conduct parallel reviews. The Safety Committee ensures safe design and operating practices and the GSO/EMO ensures compliance with regulatory agencies.

NOTE: For activities involving ionizing radiation sources, Glenn's Nuclear Regulatory Commission (NRC) license may need to be modified. This takes at least 60 days, so it is crucial that the safety permit process be initiated as early as possible so that this time element can be built into the permit processing schedule.

All comments from the GSO/EMO and the Safety Committee are forwarded to the Safety Chairperson. The Chairperson or designee will then set up a meeting with the Permit Requester to review the activity and conduct a walk-through.

Most permits require only one meeting.

What happens when the Safety Permit is approved?

After the Safety Committee approves the issuance of a safety permit, the Chairperson or designee prepares the Permit Form with appropriate operating conditions included.

The chairperson signs the original Safety Permit Form and retains committee copies if desired.

The original Safety Permit, Safety Permit Request Form (or Renewal-Change Request Form), Qualified Operators List Form, and any supporting documentation are retained by GSO.

A copy of the safety permit (with the colored NFPA hazard identification logo attached), the Safety Permit Request Form (or Renewal-Change Request Form), and the Qualified Operators List Form are sent to the requester.

The Permit Requestor is responsible for posting the safety permit package in a conspicuous place at the specified site, or if more practical, in the applicable control center at the site. It is also recommended that applicable Material Safety Data Sheet(s) (MSDS's) be posted with this package. Safety permit holders may be obtained from GSO.

What happens after the Safety Permit is approved?

Posting of the safety permit allows the requester to begin the permitted operation or experiment. The permit includes any additional operating conditions (not included in the supporting documentation) which must be met in order to maintain safe operation.

Any desired deviations from the conditions or procedures approved by the Safety Committee shall be approved by the Safety Committee Chairperson prior to implementing them. Failure to comply with the procedures and operating conditions found on the safety permit will result in termination of the operation by the Safety Committee Chairperson or GSO and/or notification to the requestor's supervisor.

Review of the permitted operation is conducted periodically by GSO via walk-through inspections.
Safety-related questions on a permitted operation should be brought to the attention of the Safety Committee Chairperson or GSO.

How long will my Safety Permit be good for?

Safety permits are typically issued for a one-year period. There may be permitted activities which the Safety Committee determines to be relatively benign and unchanging (generally not testing-related activities) where the Committee is willing to issue a two-

year or three-year permit. The decision to issue a multi-year permit is at the discretion and control of the Safety Chairperson.

A notification of expiration will be sent to the requester by GSO 60-days prior to expiration.

What happens if I need to make modifications to the test rig, facility, or activity?

Inform the Safety Committee Chairperson as soon as possible (via memo or e-mail) of the proposed modification(s). Modifications include any changes in operations or conditions beyond the operational limits/envelope specified on the safety permit or supporting documentation, and include the following examples:

a. Repairs requiring variations to code
b. Variations in hardware
c. New procedures
d. New operators
e. New operating conditions

For minor changes: (no new or different hazards): The Safety Committee Chairperson will reply with an approval memo or e-mail.

For major changes: The Safety Committee Chairperson will request that a Safety Permit Renewal-Change Request Form (see next question) or a new Safety Permit Request Form be initiated.

How do I renew (or modify) a Safety Permit?

For renewals:

A notification of expiration will be sent to the requester by GSO 60-days prior to expiration.

Ensure that all documentation that was submitted with the original Safety Permit Request Form is accurate and up-to-date. Review the Qualified Operators List Form and ensure that it is also up-to-date. Ensure that all limit switches, warning lights, and other safety features are functional.
Complete a Safety Permit Renewal-Change Request Form (NASA-C-590) and obtain your supervisor's signature of approval. Send this form to GSO at least 30-days before expiration.

For modifications:

Complete a Safety Permit Renewal-Change Request Form (NASA-C-590) and obtain your supervisor's signature of approval. Send this form and a copy of the current safety permit to GSO. The modification request should provide sufficient

information/data to enable the appropriate Safety Committee to pass judgment on the request.

GSO will record the request and forward it to the Safety Committee who will then conduct a review as described in the Review Process.

What should I do with the Safety Permit when the activity is completed?

Properly dispose of all hazardous materials used for the activity and clean up the facility for future use. Contact EMO for assistance with chemical disposal.
Take down the posted safety permit, sign and date it in the space provided, and send it to GSO.

GSO updates the safety permit database and informs the Area Chairperson via email.

Where can I get additional information on the Glenn Safety Permit System?

Call the Glenn Safety Office @ 3-3016.

Hazard Analysis - What is a Hazards Analysis?

A hazards analysis is used to identify the hazards associated with a task, system, facility, or operation, to assess the risk associated with the hazards, and to implement control measures that will reduce that risk to an acceptable level. Two types of hazard analysis support the Safety Permit process: the Hazard Analysis Worksheet (C-923a) and the Facility Hazard Analysis.

The Hazard Analysis Worksheet (C-923a) is used for activities:

a. That involve chemicals with a NFPA Rating of 1 - 3 (Health, Flammability or Reactivity) that are handled in single cylinders or drums,
b. Where there is substantial (2+ years) experience at GRC in similar or identical activities,
c. Where the potential damage from hazards inherent to the activity is less than $250,000, and
d. When the cognizant Safety Committee has approved its use.

The Detailed Hazard Analysis is used for activities:

a. That involve chemicals with a NFPA Rating of 4 (Health, Flammability or Reactivity) or Special NFPA designations (e.g. ~~W~~, OXY),
b. That involve chemicals with a NFPA Rating of 1 - 3 (Health, Flammability or Reactivity) that are handled in non-standard containers (i.e. anything larger than standard cylinders or 55-gallon drums),
c. Where there is no substantial (< 2 years) experience at GRC in similar or identical activities,

d. Where the potential damage from hazards inherent to the activity is greater than or equal to $250,000, and
e. Where non-related activities in surrounding rooms, buildings, cells, etc. can be adversely affected by the activity seeking the permit.

It consists of (1) a list of identified hazards, (2) an assessment of the risk (severity and probability), and (3) the hazard controls that will ensure the safe operation of the test, facility, or activity. Numerical tabulation of the severity and probability predictions is required. Current NASA policy requires the use of a 4 x 6 matrix of "hazard category" vs. "probability level".

HAZARD CATEGORIES

Category	Personal Illness/Injury	Equipment Loss ($K)	Downtime	Data Integrity	Environmental Effect
I Catastrophic	Death	>$1000	>4 months	Data never recoverable or primary program objectives lost	Long-term (>5 years) environmental damage or requiring >$1M to correct and/or in penalties
II Critical	Severe injury or occupational illness	$1000 to $250	4 months to 2 weeks	Repeat test program	Medium-term (1-5 years) environmental damage or requiring $250K-$1M to correct and/or in penalties
III Marginal	Minor injury or occupational illness	$250 to $25	2 weeks to 1 day	Repeat test period	Short-term (<1 year) environmental damage or requiring $25K-$250K to correct and/or in penalties
IV Negligible	No injury or illness	$25 to $1	<1 day	Repeat data point or data requires minor manipulation or computer rerun	Minor environmental damage, readily repaired, and/or requiring $1K-$25K to correct and/or in penalties

PROBABILITY LEVELS

Level	Descriptive Word	Qualitative Definition	Quantitative Definition
A	Frequent	Likely to occur repeatedly in system/component life cycle	$X > 10^{-1}$
B	Probable	Likely to occur several times in system/component life cycle	$10^{-1} \geq X > 10^{-2}$
C	Occasional	Likely to occur at sometime in system/component life cycle	$10^{-2} \geq X > 10^{-3}$
D	Remote	Not likely to occur in system/component life cycle, but possible	$10^{-3} \geq X > 10^{-6}$
E	Improbable	So unlikely, it can be assumed occurrence may not be experienced	$10^{-6} \geq X$
F	Impossible	Occurrence is physically impossible	

RISK ASSESSMENT CODE MATRIX

RAC	A Frequent	B Probable	C Occasional	D Remote	E Improbable
I Catastrophic	1	1	2	3	4
II Critical	1	2	3	4	5
III Marginal	2	3	4	5	6
IV Negligible	3	4	5	6	7

1 – 2 Unacceptable
3 Undesirable - Director of must review and approve
4 – 7 Acceptable with Area Safety Committee review

A sample of a Business Management System procedure for Hazard Analysis can be found in the GRC BMS library as:

GRC-P7030.010 Hazard Analysis Development

This document was developed as a specific work procedure for use on all projects and facilities at Plum Brook Station.

For large scale projects, modifications to facilities, or those which are operated within major facilities, it is advisable to break down the hazards into systems i.e. "nitrogen system", "liquid oxygen system", "vacuum chamber", etc. and evaluate each individually. An example of a hazard analysis for a large system can be viewed by clicking the link below:

HAZARD ANALYSIS EXAMPLE

Once the supervisor has approved the final Hazard Analysis Worksheet or the Facility Hazard Analysis, the document shall be posted electronically in that organization's BMS Library folder. This will allow GSO access for review and audit purposes.

1A.12 BIBLIOGRAPHY

- NPG 8715.3 NASA Safety Manual
- NASA-STD-8719.7 Facility System Safety Guidebook

A NASA Safety and Mission Assurance Document Tree is available online from NASA Code Q at: http://www.hq.nasa.gov/office/codeq/doctree/doctree.htm.

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